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- (54) **MOTOR MOUNTING ASSEMBLY OF AN ELECTRIC BICYCLE**
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B62K 19/30; B62K 11/02
USPC 180/206.4, 220, 228
See application file for complete search history.

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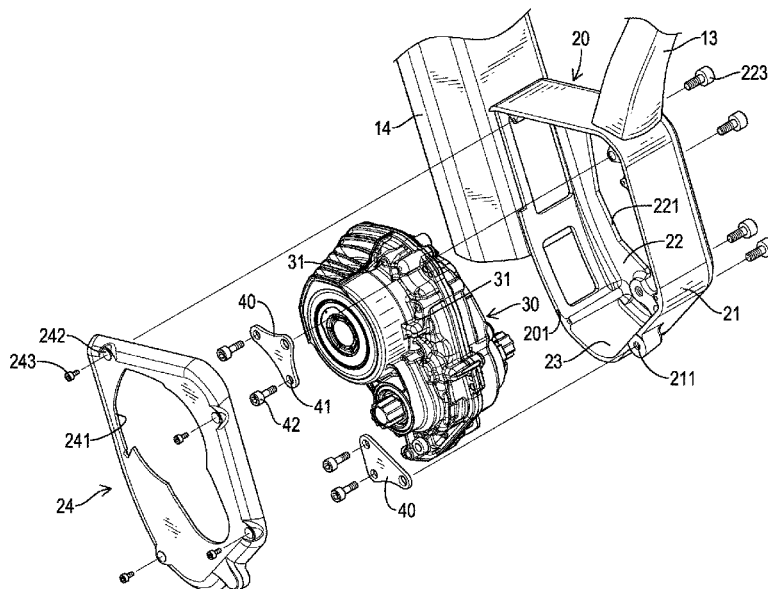
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(57) **ABSTRACT**

A motor mounting assembly of an electric bicycle has a motor-installation mount, a motor unit, and at least one adapting piece. The motor-installation mount has a mounting frame and a lateral cover. The mounting frame is annular and has a first lateral side, a second lateral side, and a lateral opening disposed on the first lateral side. The lateral cover is assembled to the first lateral side and covers the lateral opening. The motor unit is received within the motor-installation mount. Each one of the at least one adapting piece has two fastening portions. One of the fastening portions of each adapting piece is connected to the motor unit. The other fastening portion is clamped between and is connected to the lateral cover and the mounting frame.

9 Claims, 6 Drawing Sheets



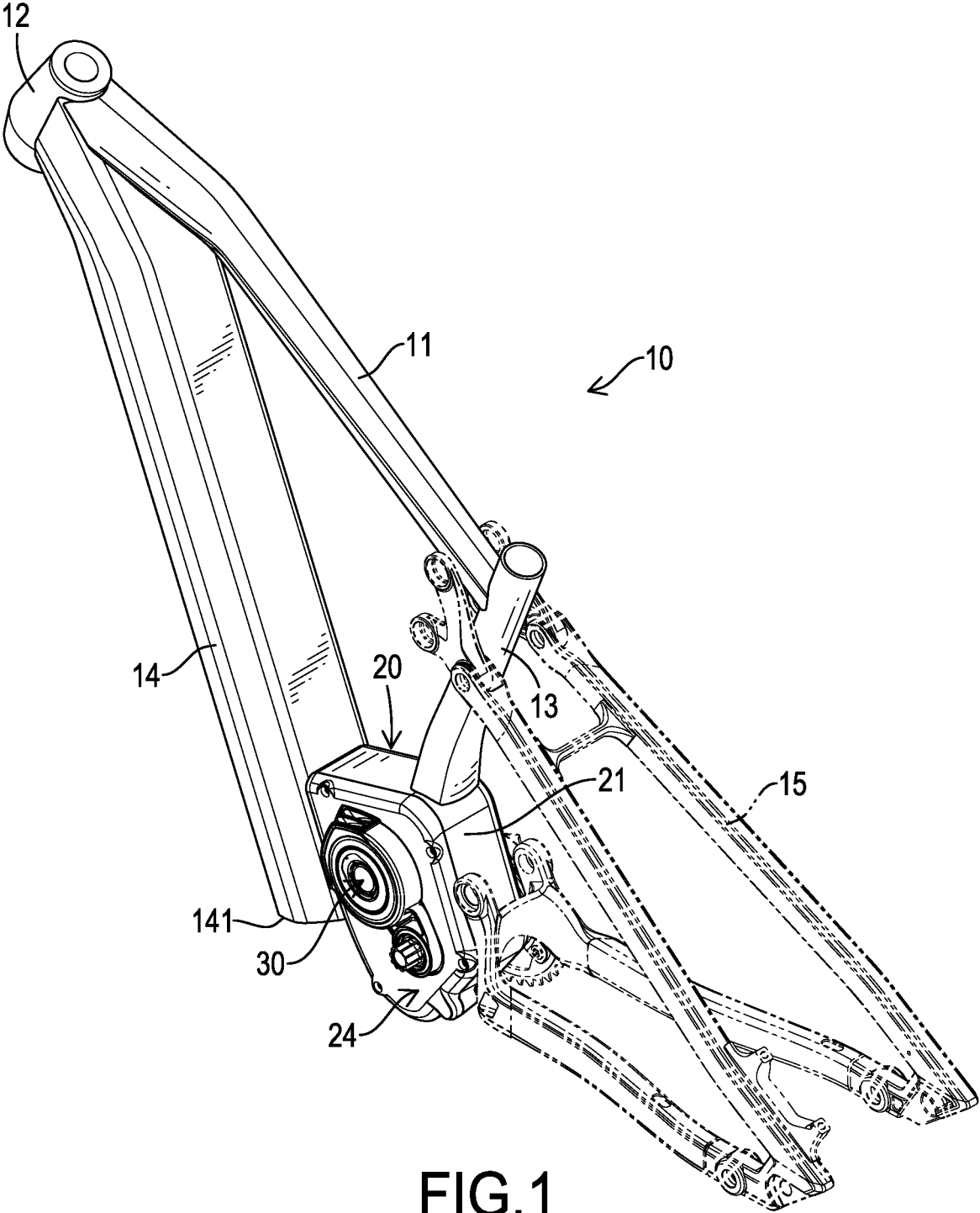


FIG. 1

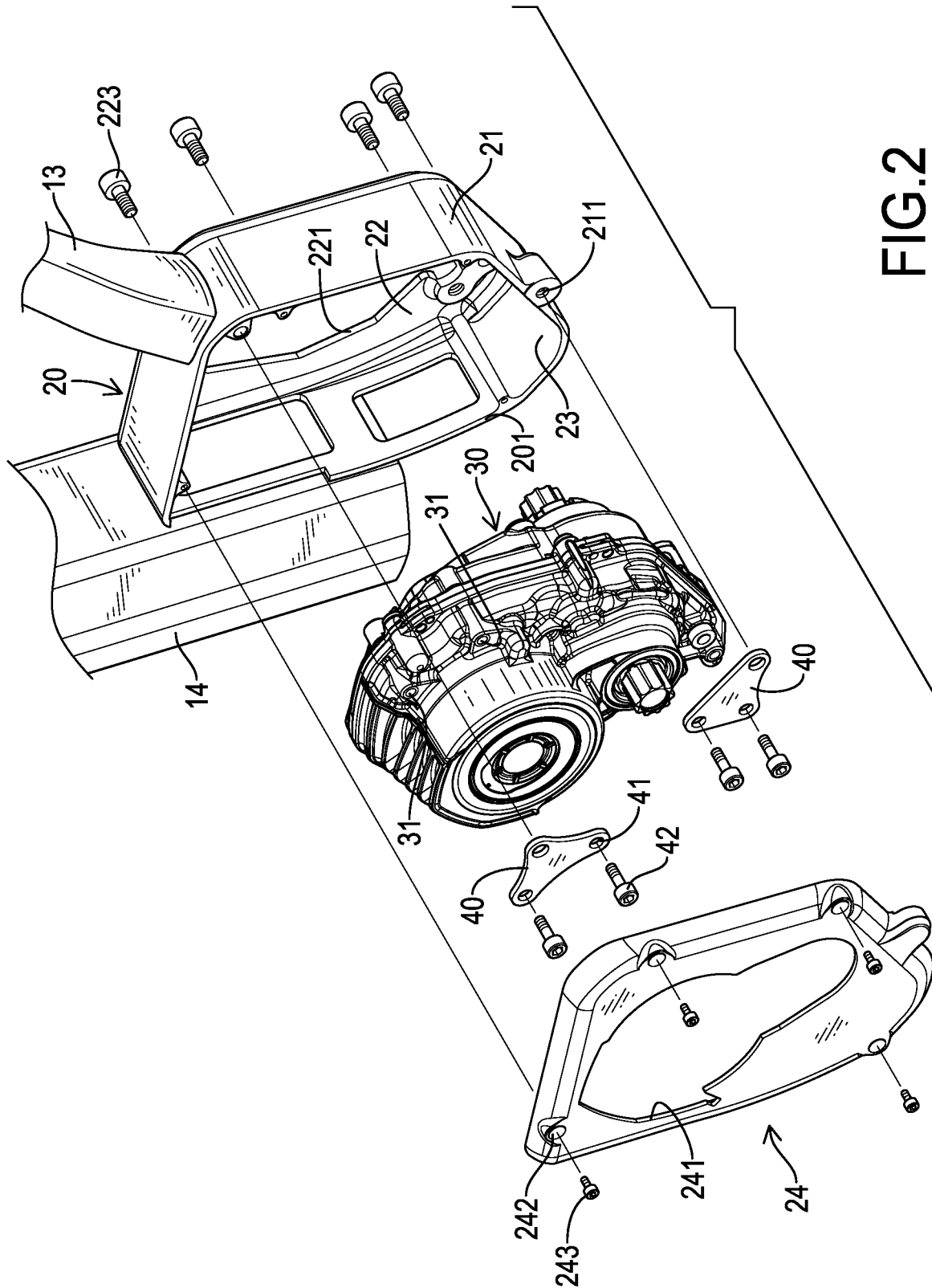


FIG.2

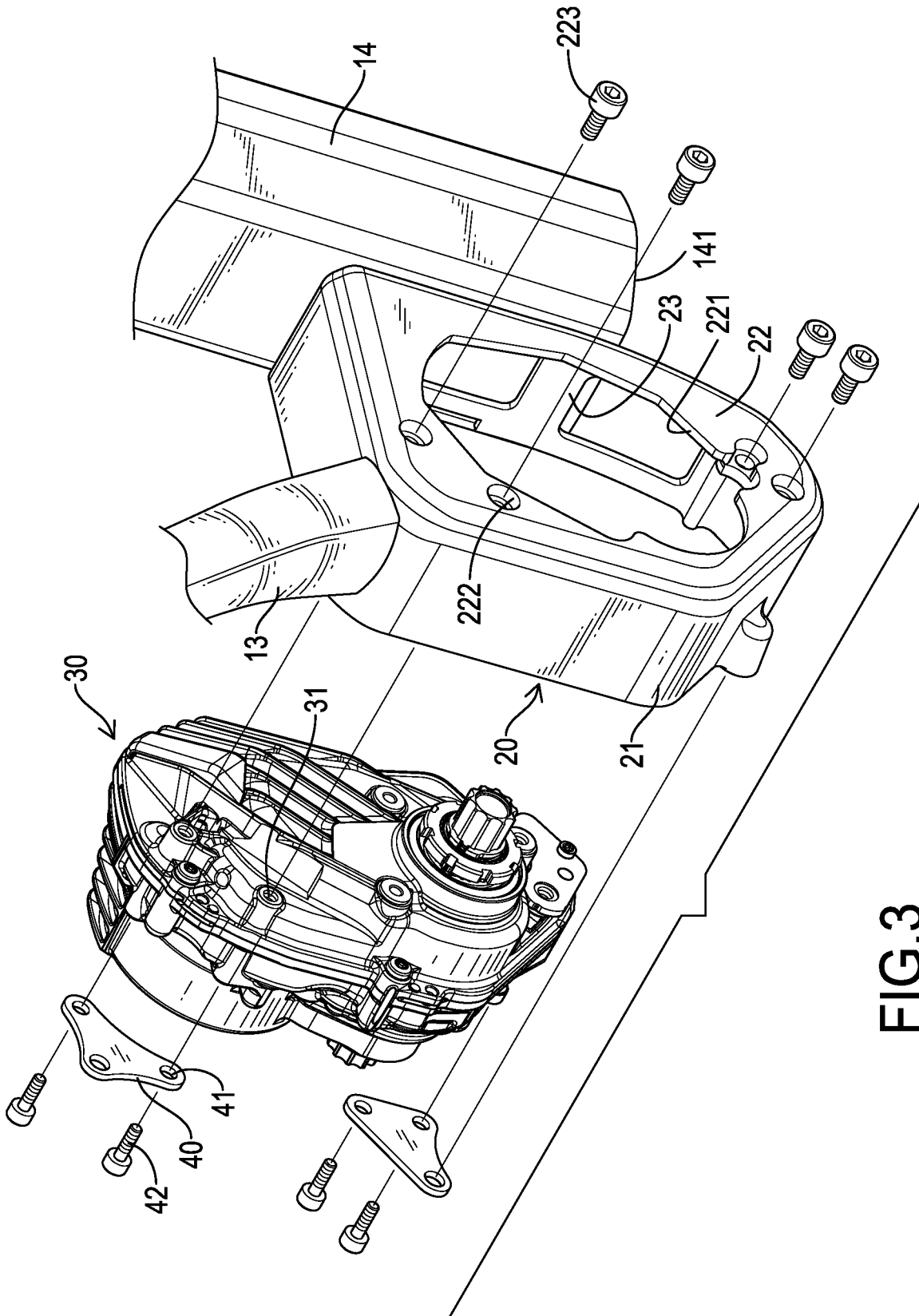


FIG.3

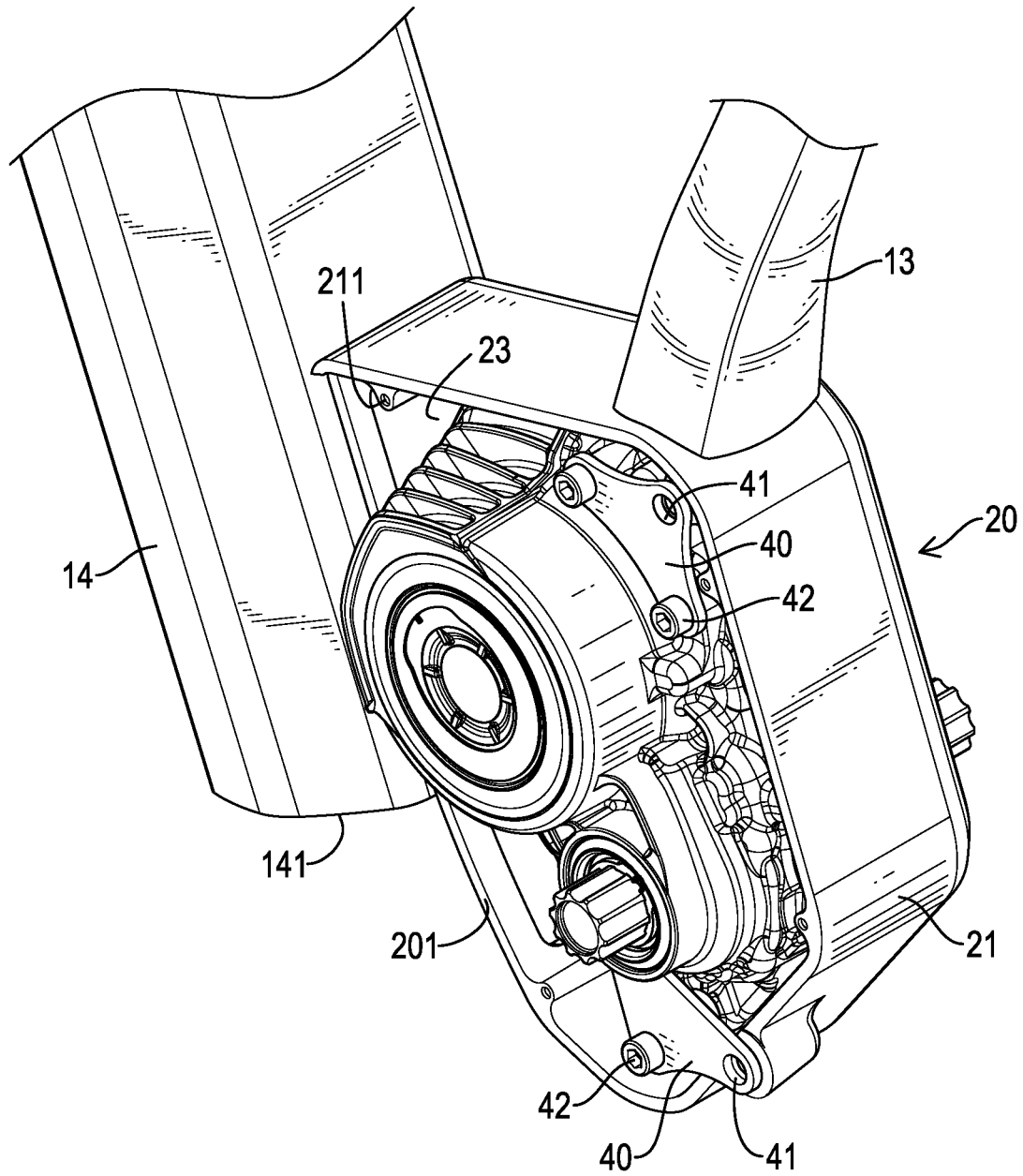


FIG.4

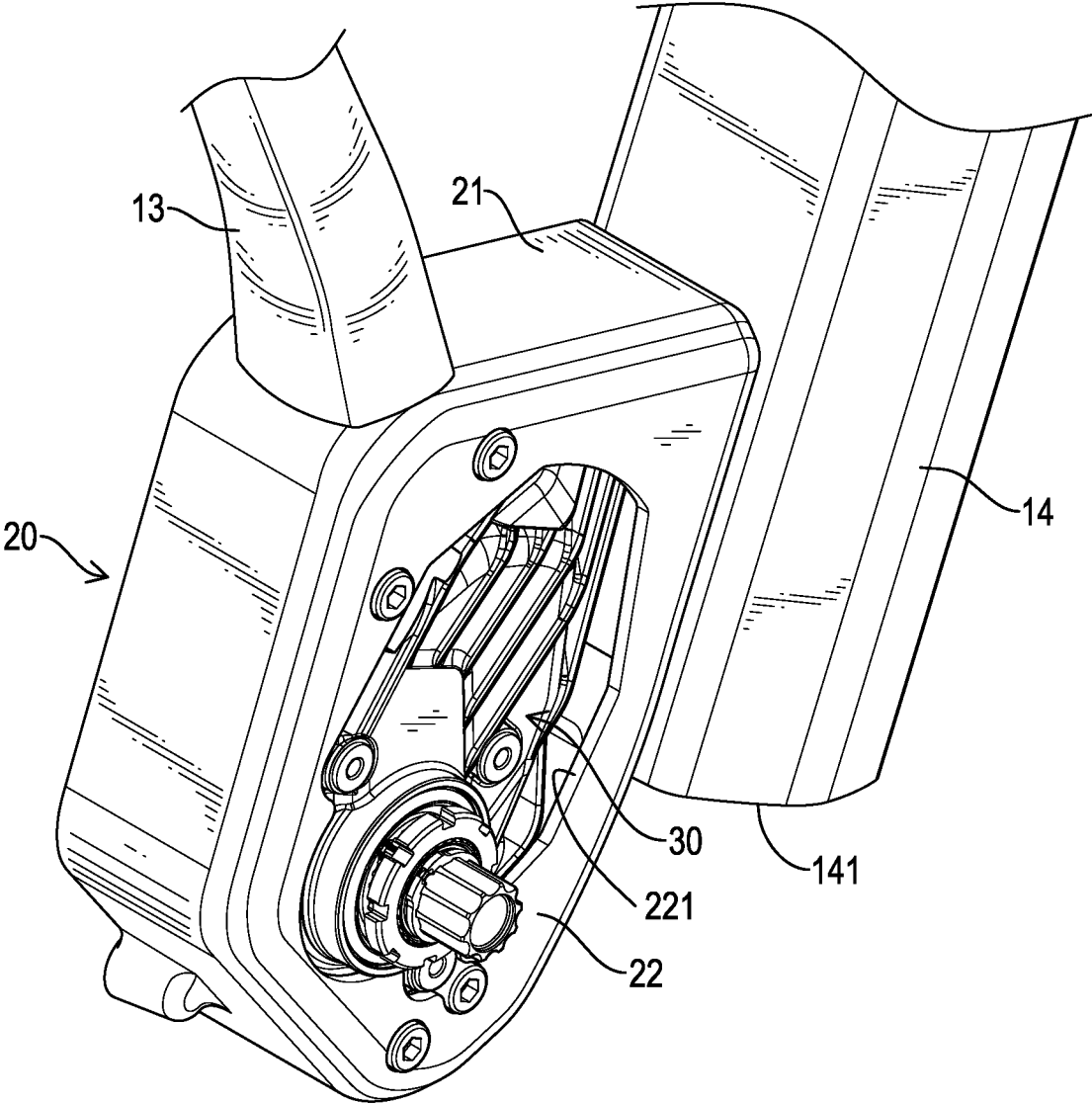


FIG.5

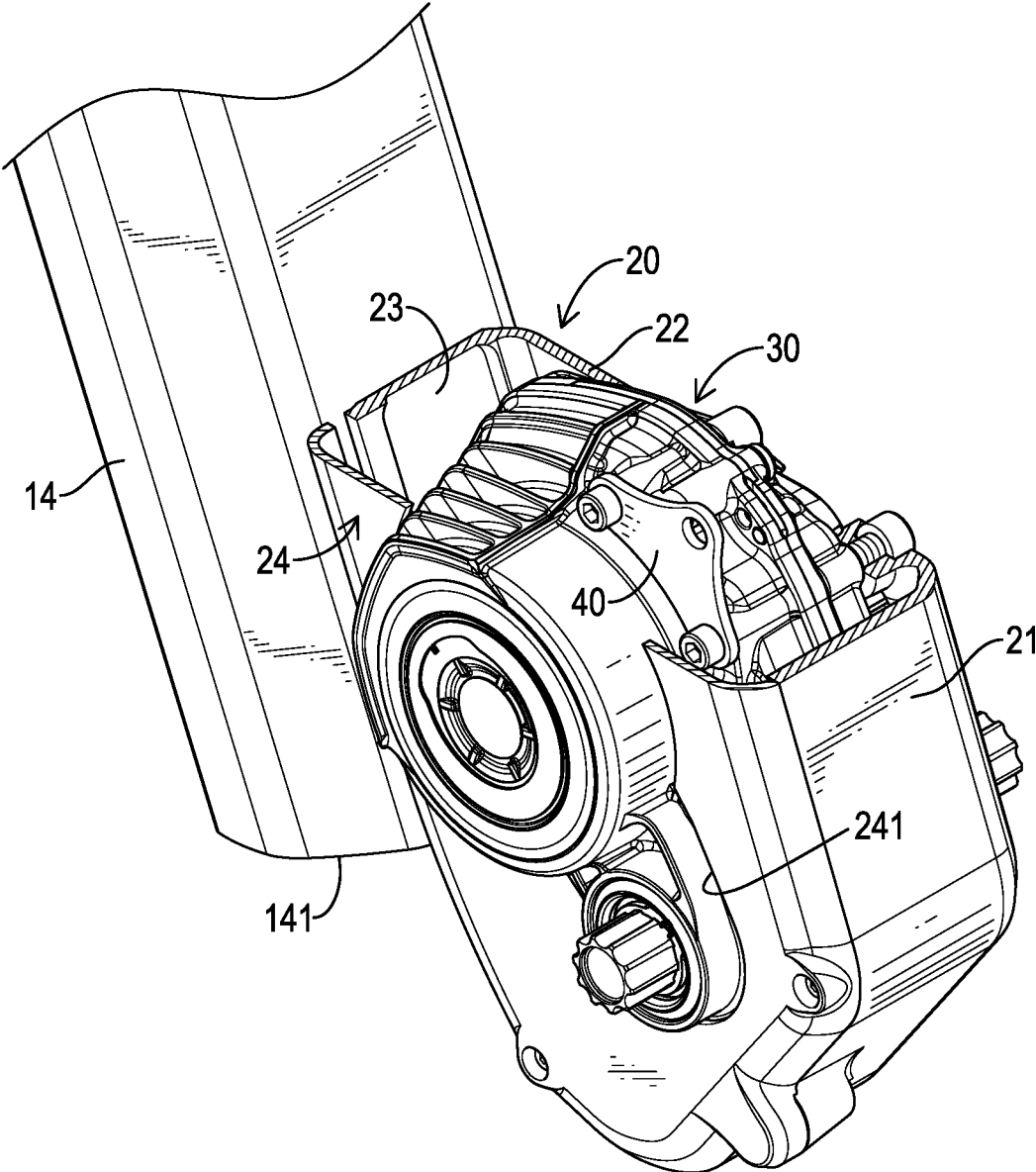


FIG.6

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MOTOR MOUNTING ASSEMBLY OF AN ELECTRIC BICYCLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an accessory of a bicycle, and more particularly to a motor mounting assembly that can firmly install a motor unit on a bicycle frame.

2. Description of Related Art

Electric bicycles can be optionally driven by motors to reduce physical burden of riders and increase riding distance, and achieve multiple purposes of exercise, fitness, transportation, and travelling. Therefore, the electric bicycles are widely favored by modern riders. With the improvement of manufacturing techniques of bicycle frames and the development of minimized and lightweight motors, the motor and a pedal assembly are usually integrated on a bottom bracket of the bicycle frame to keep an appearance of the electric bicycle compact and to improve the stability and convenience of riding.

Please refer to related patents such as TW 1618654, TW M491620, and TW M591069: a bicycle frame of a conventional electric bicycle has a top tube, a head tube, a seat tube, and a down tube that are connected to each other. A motor supporting frame is disposed at bottom ends of the seat tube and the down tube for assembling and fixing a motor unit to a bottom portion of the motor supporting frame from bottom to top. However, the bicycle frame with the motor unit fixed to the motor supporting frame in a suspended manner has the following problems and limitations in terms of implementation:

1. Since the motor unit has considerable weight, and the motor unit has to bear multiple loads provided by motor driving and rider stepping, the conventional manner of fastening the motor unit to the motor supporting frame with multiple bolts is unable to provide the motor unit with sufficient stability, and durability.

2. At present, the specifications, sizes, and mounting positions of the motor units supplied by different manufacturers are different. Therefore, the motor supporting frame of each bicycle frame is usually only suitable for a specific motor unit sold by a certain manufacturer. The manufacturers have to produce bicycle frames with various types of motor supporting frames suitable for the motor units of various specifications. Not only does it have problems such as troublesome in manufacturing and processing and increased manufacturing costs on the bicycle frame, but also the rider cannot choose motor units of different brands at will. The fun of the rider to change different motor units on his own is limited.

To overcome the shortcomings of the conventional motor supporting frames of bicycle frames of electric bicycles, the present invention provides a motor mounting assembly of an electric bicycle to mitigate or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

The main objective of the present invention is to provide a motor mounting assembly of an electric bicycle that can firmly install a motor unit on a bicycle frame.

A motor mounting assembly of an electric bicycle has a motor-installation mount, a motor unit, and at least one

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adapting piece. The motor-installation mount has a mounting frame and a lateral cover. The mounting frame is annular and has a first lateral side, a second lateral side, and a lateral opening disposed on the first lateral side. The lateral cover is assembled to the first lateral side and covers the lateral opening. The motor unit is received within the motor-installation mount. Each one of the at least one adapting piece has two fastening portions. One of the fastening portions of each adapting piece is connected to the motor unit. The other fastening portion is clamped between and is connected to the lateral cover and the mounting frame.

The advantages of the present invention include:

1. In the present invention, the motor-installation mount is an enhanced structure with the mounting frame to protect the motor unit inside the motor-installation mount. The motor-installation mount effectively promotes installation stability and durability and further enhances rigidity of the bicycle frame.

2. In the present invention, the motor unit is laterally placed inside the motor-installation mount. The motor-installation mount can be mounted by motor units of various specifications via the adapting piece. The adapting piece effectively promotes convenience of manufacturing bicycle frames and lowers cost of bicycle frame production. The adapting piece is convenient for riders to freely choose motor units of different brands and provides the rider with the fun of selecting among different motors freely.

3. In the present invention, the motor-installation mount is connected to a side of the down gibe and is free from blocking the accessing opening disposed at the bottom end of the down tube. The batteries within the down tube can be replaced from the accessing opening without removing the motor unit.

Other objects, advantages, and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a motor mounting assembly of an electric bicycle in accordance with the present invention;

FIG. 2 is an exploded perspective view of the motor mounting assembly of the electric bicycle in FIG. 1;

FIG. 3 is another exploded perspective view of the motor mounting assembly of the electric bicycle in FIG. 1;

FIG. 4 is a perspective view of the motor mounting assembly of the electric bicycle in FIG. 1, showing a lateral cover of a motor-installation mount being omitted;

FIG. 5 is a perspective view of the motor mounting assembly of the electric bicycle in FIG. 1, showing a motor unit disposed within the motor-installation mount; and

FIG. 6 is a perspective view in partial section of the motor mounting assembly of the electric bicycle.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

With reference to FIGS. 1 to 3, a motor mounting assembly of an electric bicycle in accordance with the present invention has a bicycle frame 10, a motor-installation mount 20 connected to the bicycle frame 10, a motor unit 30 assembled to the motor-installation mount 20, and two adapting pieces 40 designed for the motor unit 30. A first side and a second side are oppositely defined on the motor unit 30 and respectively have multiple fins. The motor unit

30 also has a driven shaft for connecting the crank and the chainwheel of the bicycle. The first and second sides of the motor unit **30** have multiple threaded holes **31** respectively. The multiple threaded holes **31** of each side of the motor unit **30** are disposed along a margin of the motor unit **30**. The multiple threaded holes **31** of each side of the motor unit **30** are configured to assemble the motor unit **30** via bolted connection.

Wherein, the bicycle frame **10** has a top tube **11** being substantially horizontal, a head tube **12** connected to a front end of the top tube **11**, a seat tube **13** connected to a rear end of the top tube **11**, a down tube **14** with a front end connected to the head tube **12**, and a seat stay **15** connected to the seat tube **13** and disposed behind the seat tube **13**. Batteries may be received within the down tube **14** and can be replaced via an accessing opening **141** disposed at a bottom end of the down tube **14**. The bicycle frame **10** of the present invention is similar to conventional bicycle frames. Detailed description of the bicycle frame **10** is omitted accordingly.

The motor-installation mount **20** has a mounting frame **21**, a lateral plate **22**, an installation space **23**, and a lateral cover **24**. The mounting frame **21** is annular and has a first lateral side, a second lateral side, and a lateral opening **201** disposed on the first lateral side of the mounting frame **21**. The first side and the second side of the motor unit **30** respectively face the first lateral side and the second lateral side of the motor-installation mount **20**. The lateral plate **22** is integrally formed on the second lateral side of the mounting frame **21**. The installation space **23** is disposed within the motor-installation mount **20** and is enclosed and formed by the mounting frame **21** and the lateral plate **22**. The lateral cover **24** is detachably assembled to the first lateral side via bolted connection and covers the lateral opening **201**. The mounting frame **21** has a contour being polygonal and corresponding to the contour of the motor unit **30**. The mounting frame **21** also has a width smaller than a width of the motor unit **30**. The mounting frame **21** further has multiple threaded bores **211** disposed at intervals on the first lateral side of the mounting frame **21**. The threaded bores **211** are designed corresponding to each adapting piece **40** and the lateral cover **24**. A top side of the mounting frame **21** is welded to a bottom end of the seat tube **13**. A front side of the mounting frame **21** is welded to a corresponding side of the down tube **14**. Therefore, the motor-installation mount **20** is stably and firmly connected to the bicycle frame **10** and is free from blocking the accessing opening **141** disposed at the bottom end of the down tube **14**.

The lateral plate **22** is directly and integrally formed on and connected to the second lateral side of the mounting frame **21**. The lateral plate **22** has a through hole **221** for the fins of the first side and the driven shaft of the motor unit **30** to protrude therein. The lateral plate **22** also has multiple fastening holes **222**. The multiple fastening holes **222** correspond to the multiple threaded holes **31** of the motor unit **30** in position. With reference to FIGS. **3** and **5**, multiple bolts **223** are respectively mounted through the multiple fastening holes **222** and are threaded to the multiple threaded holes **31** to fix the second side of the motor unit **30** to the mounting frame **21**. With reference to FIGS. **2** and **4**, the mounting frame **21**, the lateral plate **22**, and the lateral cover **24** surround the installation space **23** to facilitate the motor unit **30** to be fitted and assembled in the installation space **23**.

With reference to FIGS. **1** and **2**, the lateral cover **24** is a plate-like cover and corresponds to the mounting frame **21** in shape. The lateral cover **24** has a through hole **241** defined through a surface of the lateral cover **24**. The through hole

241 of the lateral cover **24** is configured for the fins of the first side and the driven shaft of the motor unit **30** to protrude therein. The lateral cover **24** further has multiple threading bores **242** corresponding to the multiple threaded bores **211** of the mounting frame **21** in position. Multiple bolts **243** can be respectively mounted through the multiple threading bores **242** and respectively threaded to the multiple threaded bores **211** to fix the lateral cover **24** to the mounting frame **21** such that the lateral cover **24** covers the lateral opening **201**.

With reference to FIGS. **2** and **4**, each adapting piece **40** is substantially triangular and has three fixing holes **41** respectively disposed at three corners of the adapting piece **40**. Two of the three fixing holes **41** correspond to the threaded holes **31** of the motor unit **30** in position. Two bolts **42** are respectively mounted through the two fixing holes **41** and are respectively threaded to corresponding two of the multiple threaded holes **31** to fix the adapting piece **40** to the motor unit **30**. The last one of the three fixing holes **41** corresponds to threaded bores **211** of the mounting frame **21** in position. A corresponding one of said bolts **243** is mounted through the fixing hole **41** to connect the adapting piece **40** and the motor-installation mount **20** to achieve the effect that connects a corresponding side of the motor unit **30** and the motor-installation mount **20**.

With reference to FIGS. **1**, **2**, and **6**, the motor-installation mount **20** is an enhanced mount structure with the mounting frame **21** and the installation space **23**. Accompanied with the adapting pieces **40** and the bolts **223**, **42**, **243**, the motor unit **30** is fixed within the installation space **23** and protected by the mounting frame **21**. Installation stability and durability of the motor unit **30** are highly promoted accordingly. With connection of the seat tube **13**, the down tube **14**, and the motor-installation mount **20**, rigidity of the bicycle frame **10** is enhanced. With reference to FIG. **4**, the motor-installation mount **20** is connected to the corresponding side of the down tube **14** and is free from blocking the accessing opening **141** disposed at the bottom end of the down tube **14**. The batteries within the down tube **14** can be replaced from the accessing opening **141** without removing the motor unit **30**.

With reference to FIGS. **4** and **6**, the motor unit **30** can be laterally placed into the installation space **23** of the motor-installation mount **20**. With the adapting pieces **40**, the motor-installation mount **20** can be connected with motor units of various specifications.

Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and features of the invention, the disclosure is illustrative only. Changes may be made in the details, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A motor mounting assembly of an electric bicycle, and the motor mounting assembly comprising:
 - a motor-installation mount having
 - a mounting frame being annular and having
 - a first lateral side;
 - a second lateral side; and
 - a lateral opening disposed on the first lateral side;
 - a lateral plate formed on the second lateral side and having a through hole;
 - an installation space formed by the mounting frame and the lateral plate;

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a lateral cover detachably assembled to the first lateral side, covering the lateral opening, and having a through hole;

a motor unit received in the installation space of the motor-installation mount and having

a first side and a second side oppositely defined on the first lateral side of the motor unit facing the first lateral side of the motor-installation mount and partially protruding in the through hole of the lateral cover, and the second side of the motor unit facing the second lateral side of the motor-installation mount and partially protruding in the through hole of the lateral plate; and

each one of the first and second sides of the motor unit having multiple threaded holes disposed along a margin of the motor unit at intervals, wherein the motor unit is fastened to the lateral plate via multiple bolts mounted through the lateral plate and fastened in the threaded holes on the second side of the motor unit; and

at least one adapting piece mounted between the motor unit and the lateral cover, and each of the at least one adapting piece having two fastening portions;

one of the two fastening portions of each of the at least one adapting piece fastened to at least one of the threaded holes on the first side of the motor unit via at least one bolt;

the other fastening portion clamped between the lateral cover and the mounting frame and fastened to the lateral cover and the mounting frame via at least one bolt.

2. The motor mounting assembly of the electric bicycle as claimed in claim 1, wherein

a contour of the mounting frame and a contour of the motor unit correspond in shape;

a width of the mounting frame is smaller than a width of the motor unit;

a top side of the mounting frame is connected to a bottom end of a seat tube; and

a front side of the mounting frame is connected to a corresponding side of a down tube.

3. The motor mounting assembly of the electric bicycle as claimed in claim 1, wherein

the mounting frame has multiple threaded bores disposed at intervals on the first lateral side of the mounting frame;

the lateral cover has multiple threading bores, wherein multiple bolts are respectively mounted through the multiple threading bores of the lateral cover and respectively fastened to the threaded bores of the mounting frame for fastening the lateral cover to the mounting frame.

4. The motor mounting assembly of the electric bicycle as claimed in claim 1, wherein

each one of the at least one adapting piece has at least two fixing holes;

the at least one bolt is mounted through at least one of the at least two fixing holes of each one of the at least one adapting piece to fasten the adapting piece to the motor unit; and

at least one of the at least two fixing holes of each one of the at least one adapting piece aligns with the threaded bores of the mounting frame for fastening the adapting piece to the motor-installation mount.

5. The motor mounting assembly of the electric bicycle as claimed in claim 2, wherein

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each one of the at least one adapting piece has at least two fixing holes;

the at least one bolt is mounted through at least one of the at least two fixing holes of each one of the at least one adapting piece to fasten the adapting piece to the motor unit; and

at least one of the at least two fixing holes of each one of the at least one adapting piece aligns with the threaded bores of the mounting frame for fastening the adapting piece to the motor-installation mount.

6. The motor mounting assembly of the electric bicycle as claimed in claim 3, wherein

each one of the at least one adapting piece has at least two fixing holes;

the at least one bolt is mounted through at least one of the at least two fixing holes of each one of the at least one adapting piece to fasten the adapting piece to the motor unit; and

at least one of the at least two fixing holes of each one of the at least one adapting piece aligns with the threaded bores of the mounting frame for fastening the adapting piece to the motor-installation mount.

7. The motor mounting assembly of the electric bicycle as claimed in claim 4, wherein

the at least one adapting piece includes two adapting pieces;

each one of the two adapting pieces is triangular and has three fixing holes respectively disposed at three corners of the adapting piece;

two bolts are mounted through two of the three fixing holes of each one of the two adapting pieces to fasten the adapting piece to the motor unit, and the other one of the three fixing holes of the adapting pieces aligns with one of the threaded bores of the mounting frame for fastening the adapting piece to the motor-installation mount.

8. The motor mounting assembly of the electric bicycle as claimed in claim 5, wherein

the at least one adapting piece includes two adapting pieces;

each one of the two adapting pieces is triangular and has three fixing holes respectively disposed at three corners of the adapting piece;

two bolts are mounted through two of the three fixing holes of each one of the two adapting pieces to fasten the adapting piece to the motor unit, and the other one of the three fixing holes of the adapting pieces aligns with one of the threaded bores of the mounting frame for fastening the adapting piece to the motor-installation mount.

9. The motor mounting assembly of the electric bicycle as claimed in claim 6, wherein

the at least one adapting piece includes two adapting pieces;

each one of the two adapting pieces is triangular and has three fixing holes respectively disposed at three corners of the adapting piece;

two bolts are mounted through two of the three fixing holes of each one of the two adapting pieces to fasten the adapting piece to the motor unit, and the other one of the three fixing holes of the adapting pieces aligns with one of the threaded bores of the mounting frame for fastening the adapting piece to the motor-installation mount.